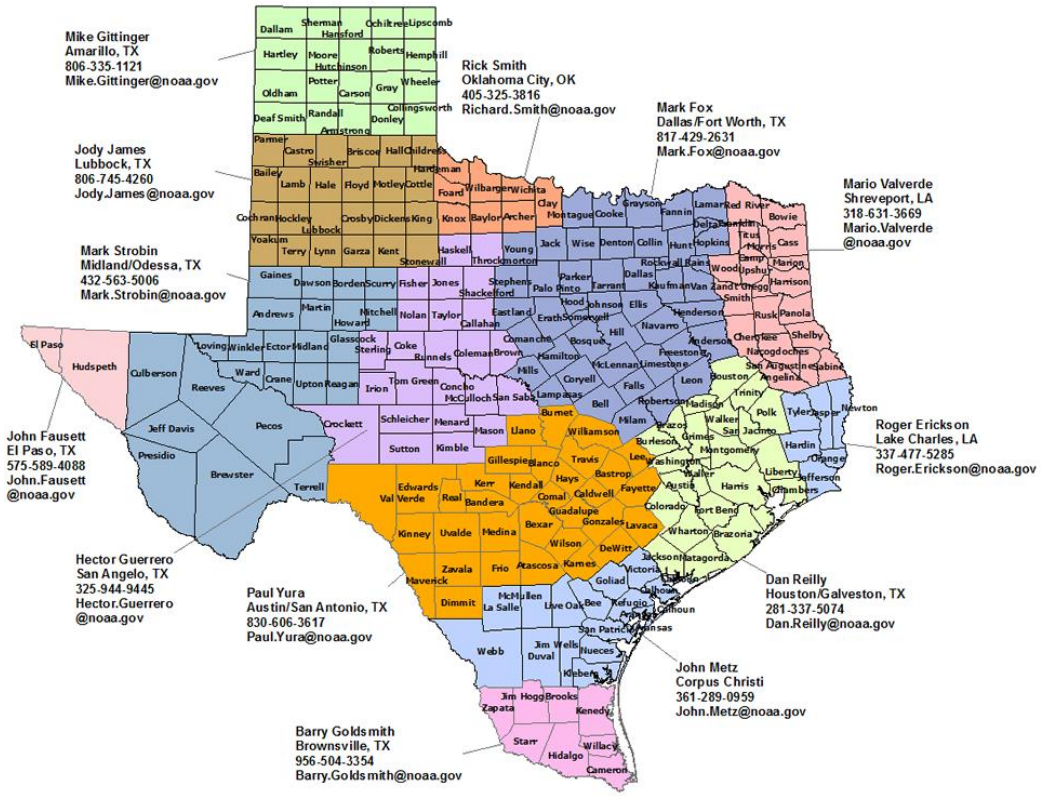
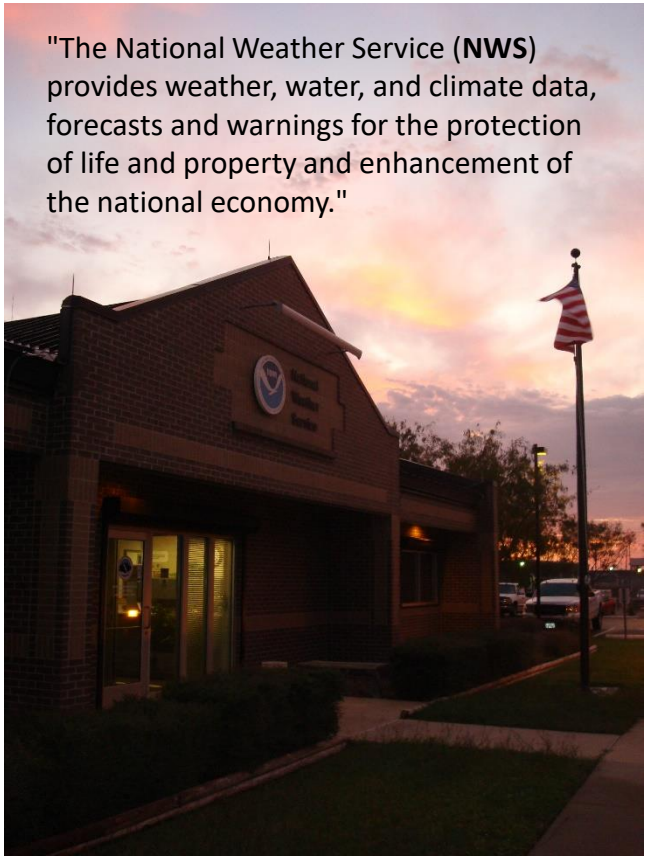
# NWS Serves Texas



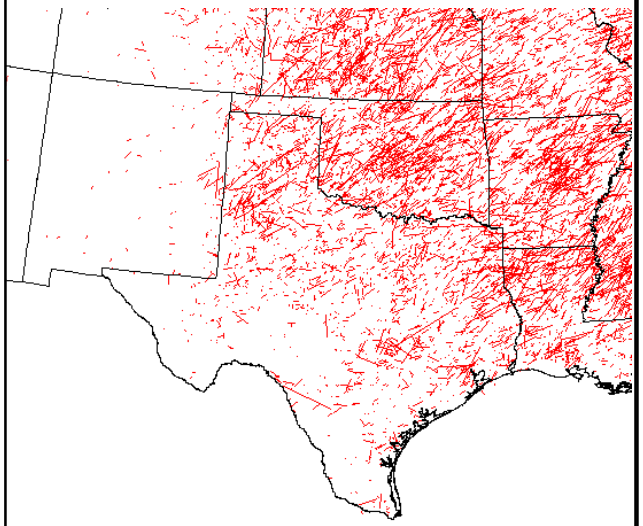

*NWS operates 13 Weather Forecast Offices that serve Texas.*

*Each office is open 24 x 7 (365 days/year) with staff 21 people (meteorologists/technicians)*

# Severe Weather History

*1950 to 2016*

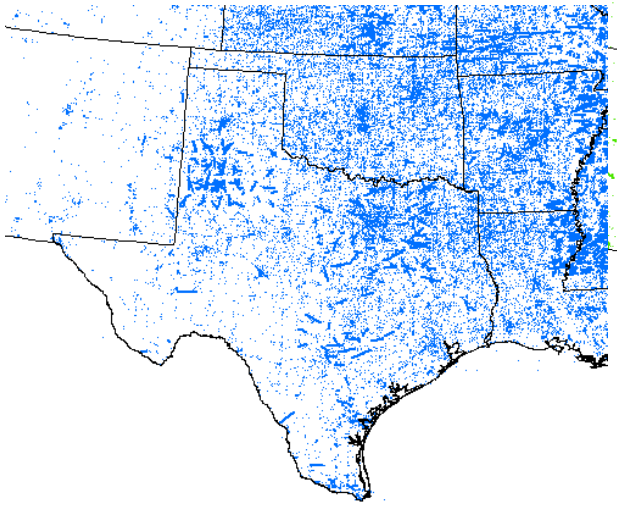
## Tornadoes



*Texas Averages 140 Tornadoes Per Year*

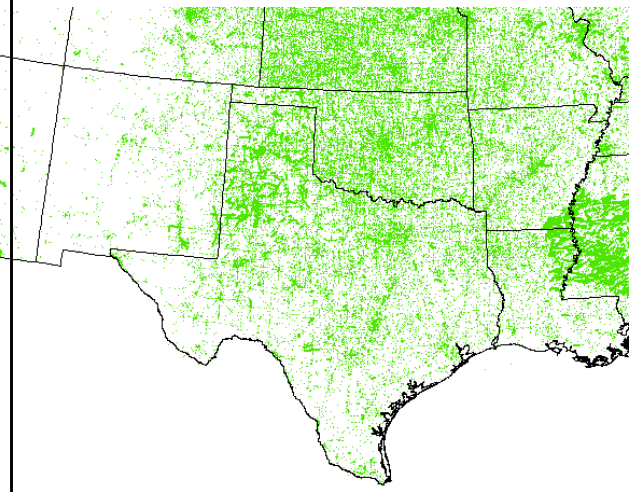
*4 Fatalities per year*

## Damaging Winds



*Texas Averages 2-13 Severe T-Storm Wind days Per Year*

## Hail

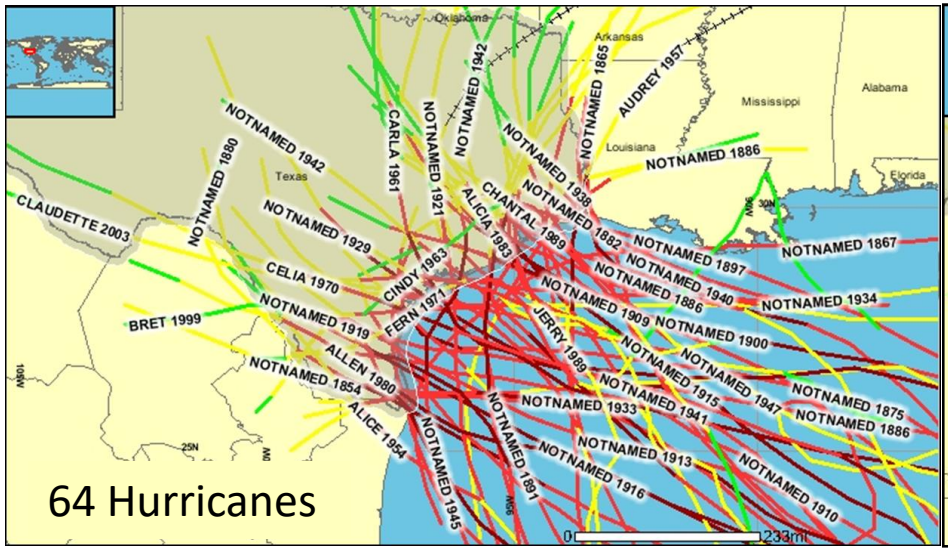


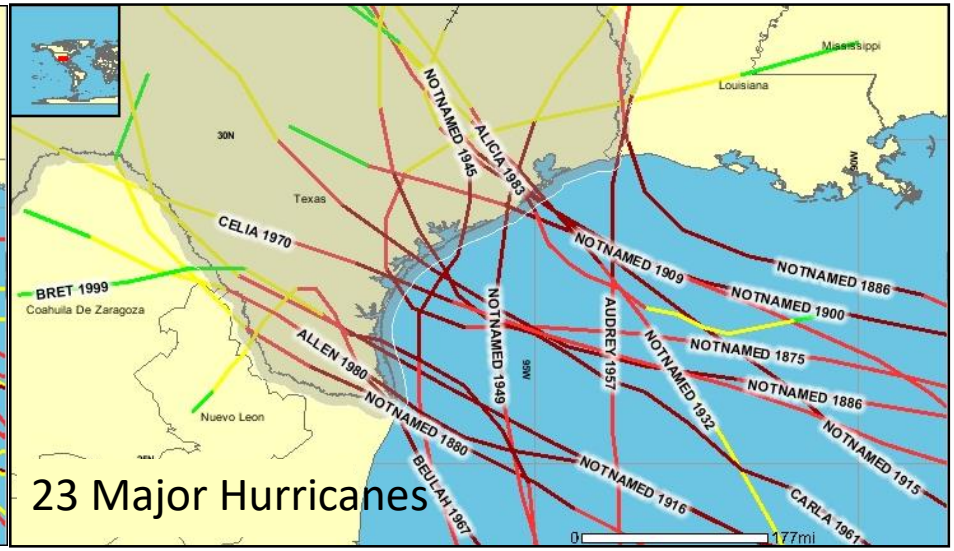
*Texas Averages 2-11 Severe Hail days Per Year*

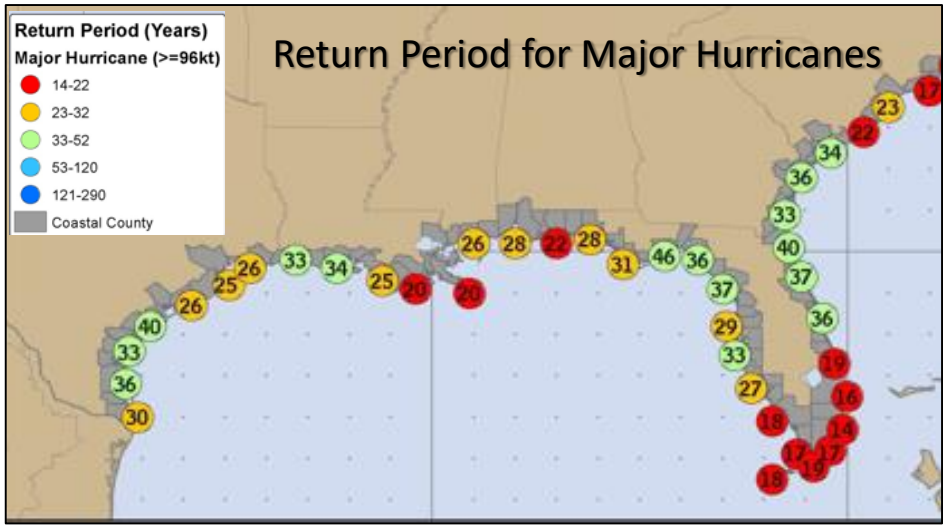
*Source - Storm Prediction Center Archives: http://www.spc.noaa.gov*

# Hurricane History

*1851 to 2017*



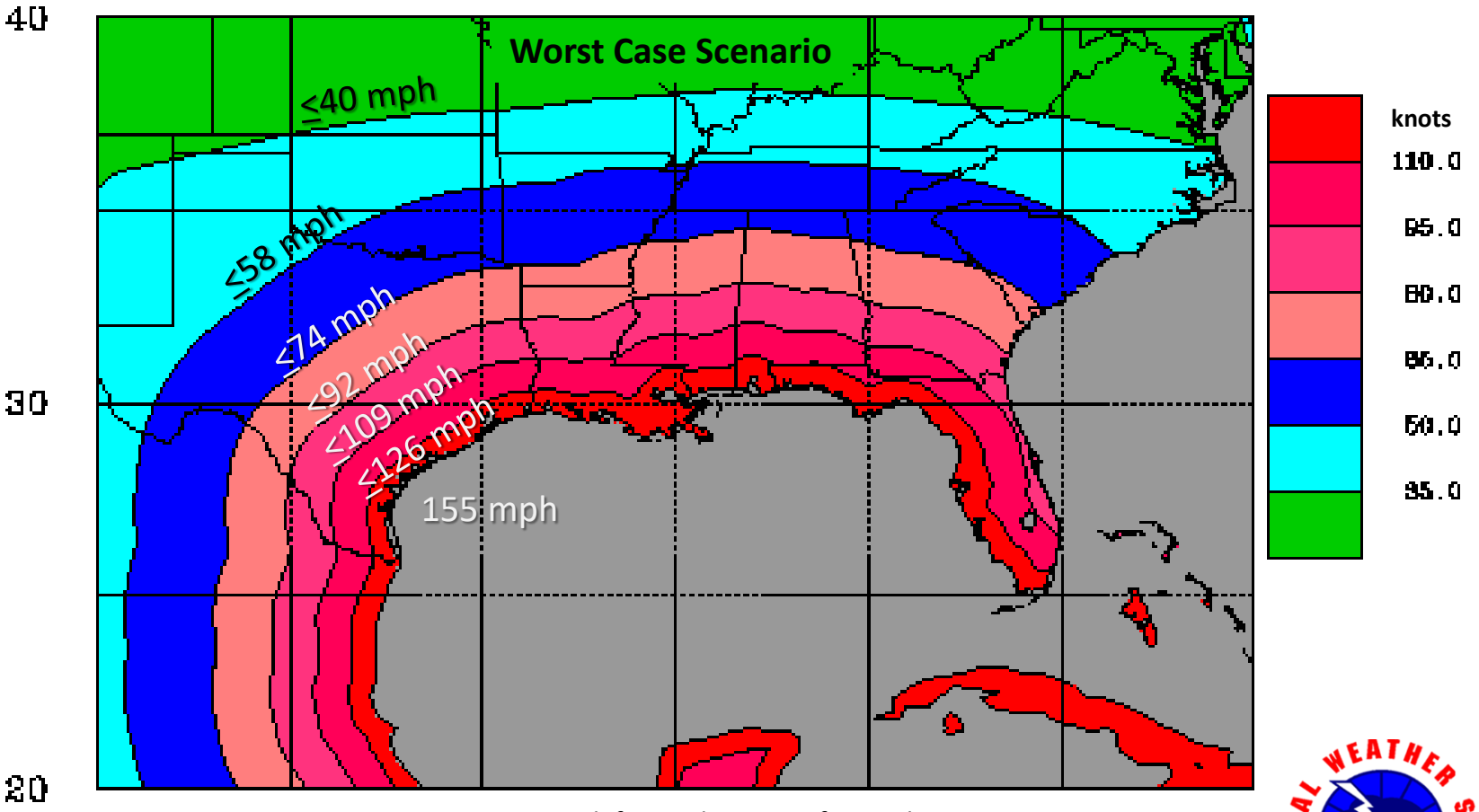




- On average, a hurricane strikes Texas about every 3 years
- On average, major hurricanes strike Texas every 7 years
- Return Period for major hurricanes on the mid Texas coast specifically are every 30-40 years.

*Source – NOAA National Ocean Service : https://oceanservice.noaa.gov/news/historical-hurricanes*

# Damaging Wind Threat

Inland Wind Decay Model

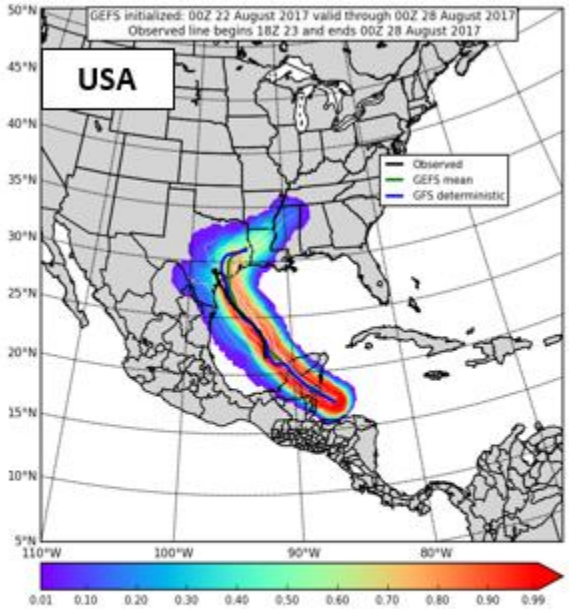


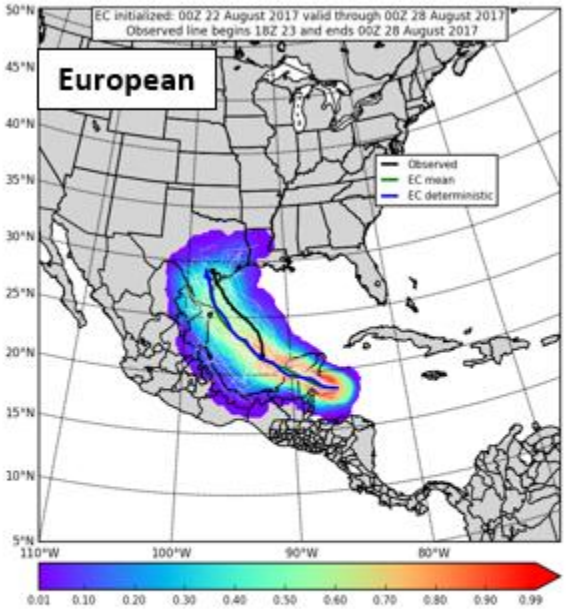

*Category 5 with forward motion of 26 mph*

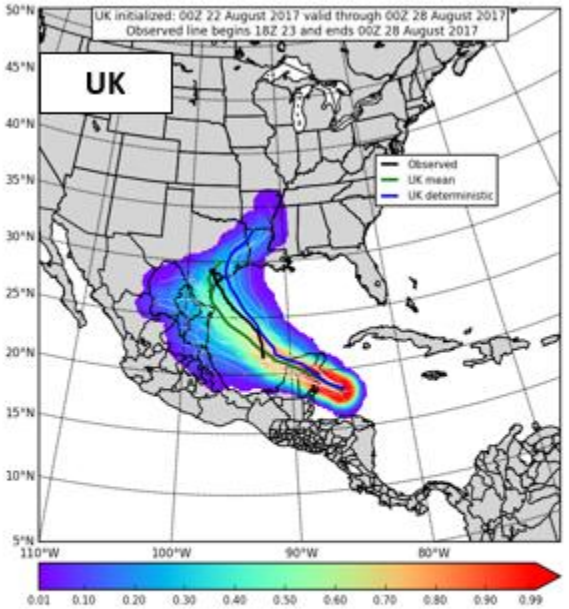
*Source – NOAA National Hurricane Center:* https://www.nhc.noaa.gov/aboutmeow.shtml

# Model Forecasts

Monday August 21, 2017



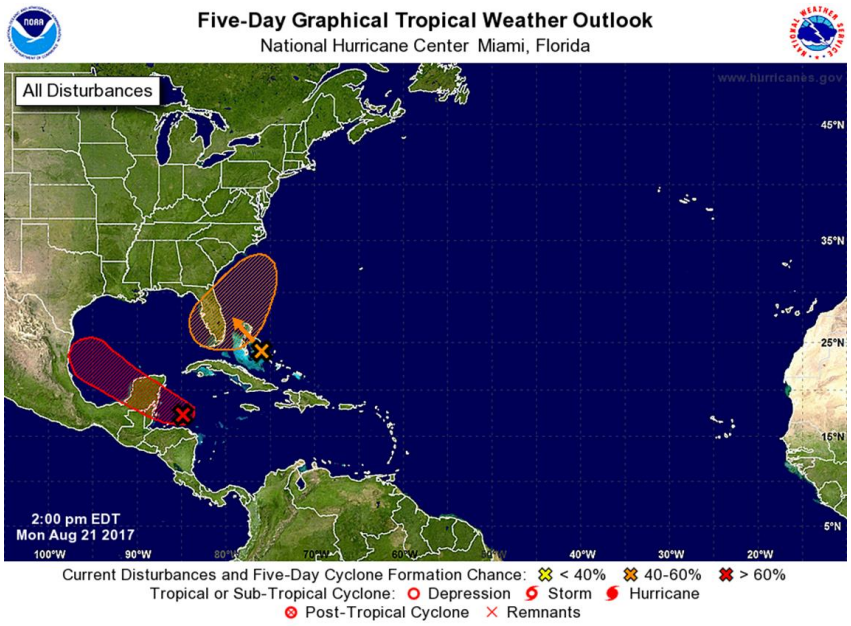




Four days prior to Harvey's landfall in Texas, deterministic and ensemble global models were more certain Harvey would cross the Yucatán Peninsula and make landfall in Texas

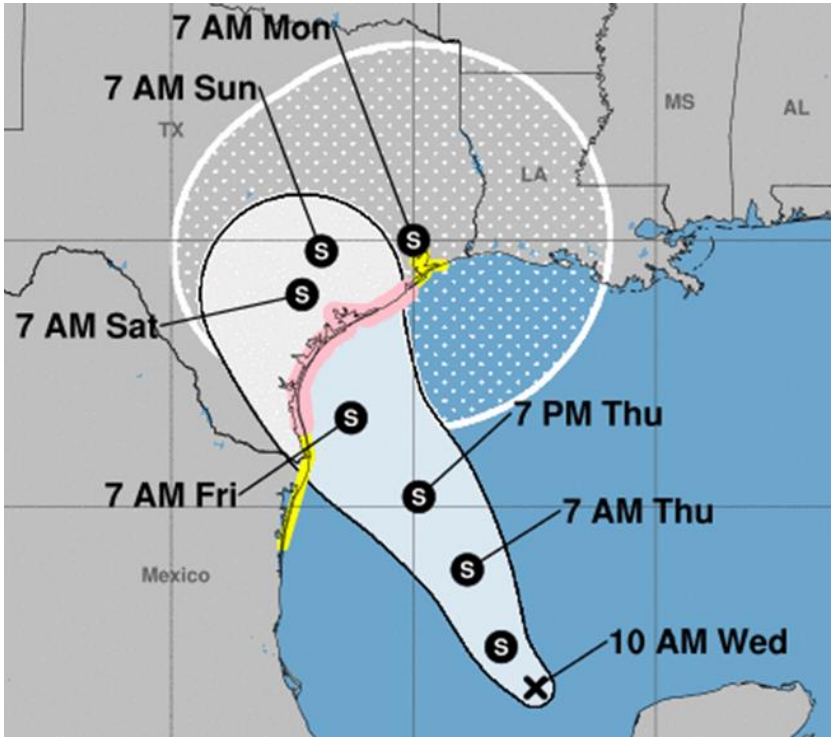
# Harvey's Forecast

## 5 Day Tropical Weather Outlook




High probability of development in the Gulf of Mexico in next 5 days

## Harvey Became a Tropical Depression

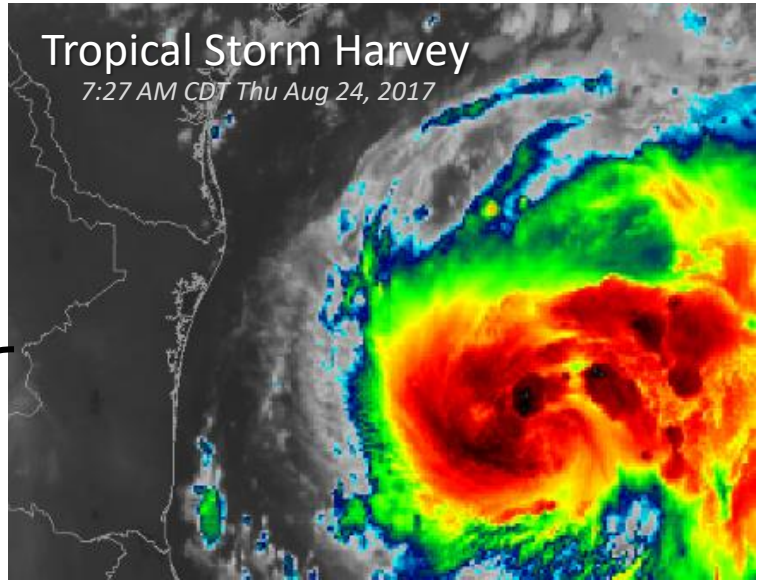



*10 AM Wed Aug 23, 2017*

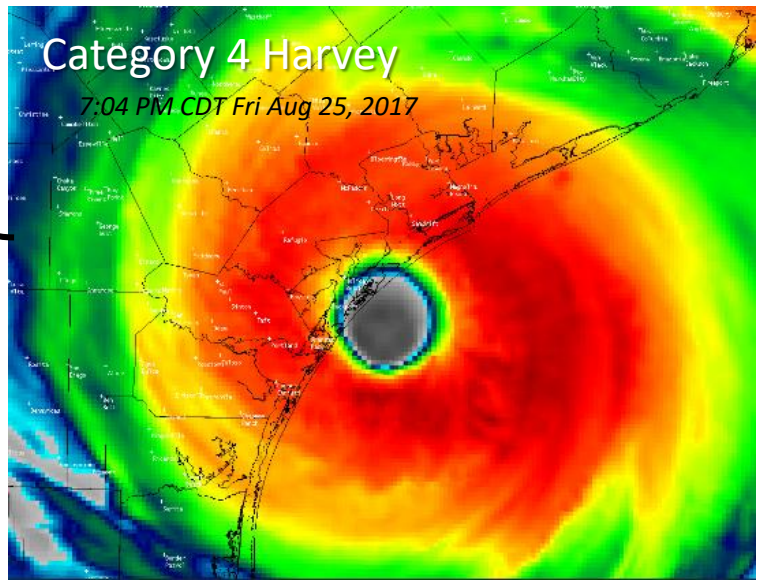
NWS Conducted 21
Hurricane Watches were issued at 10 AM Wed, Hurricane Warnings at 4:30 AM Thu

*Source – NOAA National Hurricane Center:* https://www.nhc.noaa.gov/archive/2017/HARVEY.shtml?

# Harvey's Rapid Development

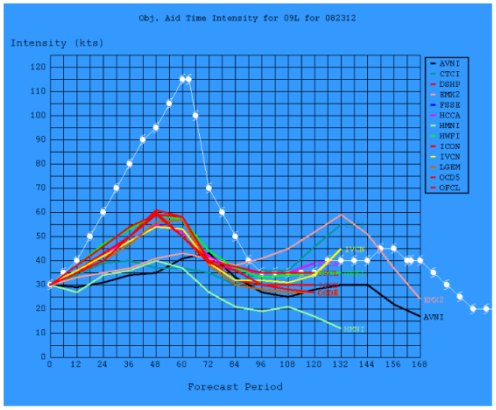



36 Hours

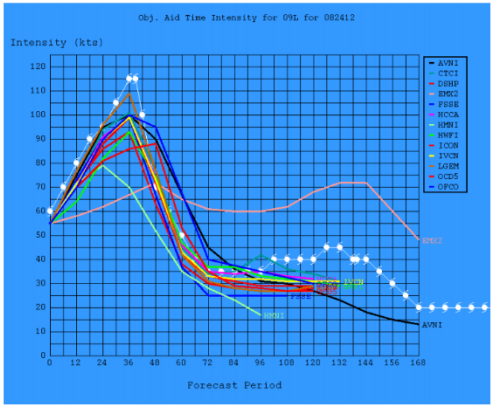



- Harvey formed as a tropical depression at 10 am Wed Aug 23, 2017.
- Harvey became a Category 4 hurricane at 6 pm Fri Aug 25, 2017 as it was making landfall over San Jose Island.
- Harvey's rapid intensification to a major hurricane was only forecast 20 hours in advance of tropical storm force winds reaching the Texas Coast.
- Only 4 Texas hurricanes have undergone rapid intensification before landfall in historical record. *(Celia 1970, Alicia 1983, 1932 hurricane, and Harvey)*

Intensity Models for Harvey



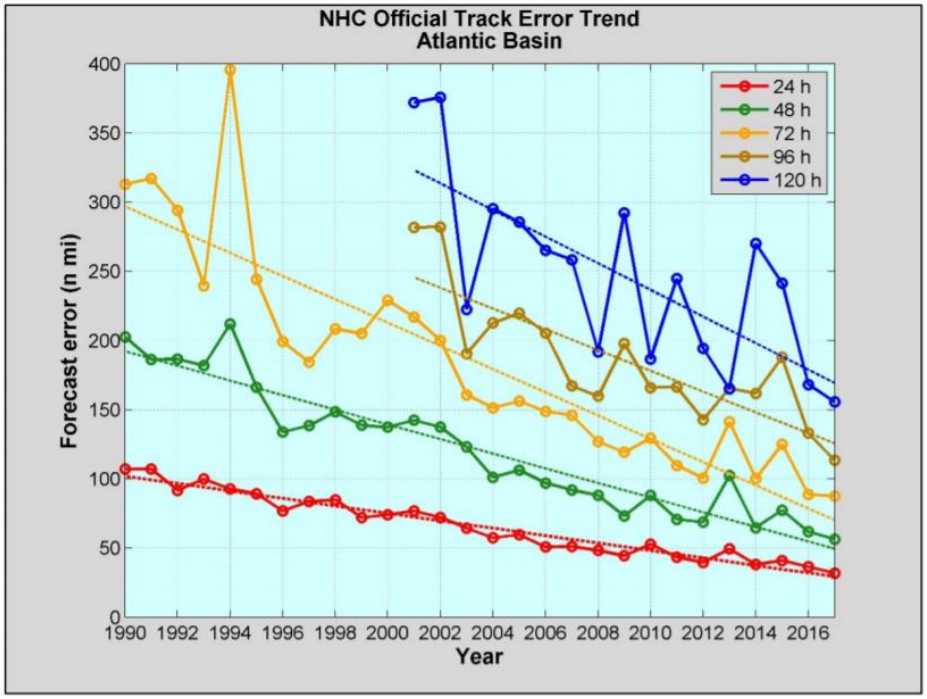

Wed, Aug 23, 2017




Thu, Aug 24, 2017

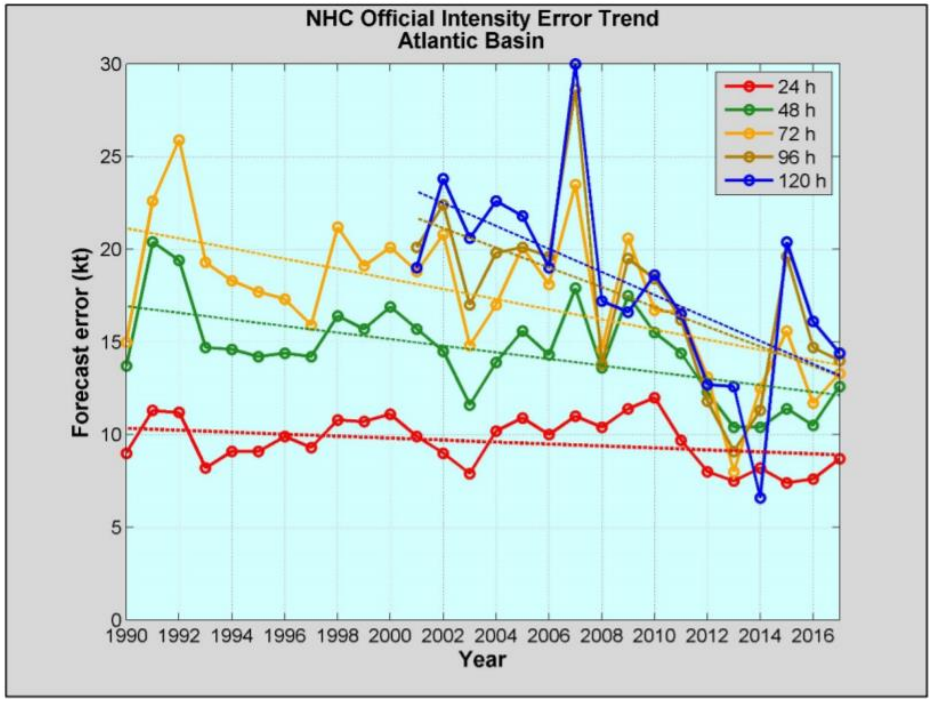
# NHC Forecast Errors

## Track Error Trends




NHC continues to show steady improvement in Track forecasts from year to year.

## Intensity Error Trends

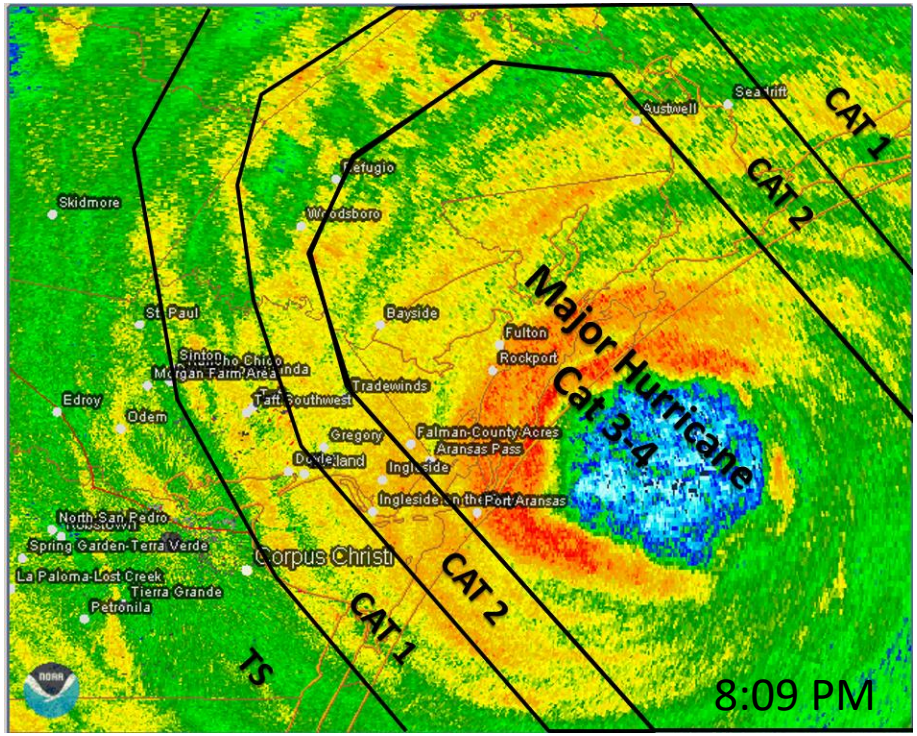



NHC has only shown a slight improvement in intensity forecasts from year to year.

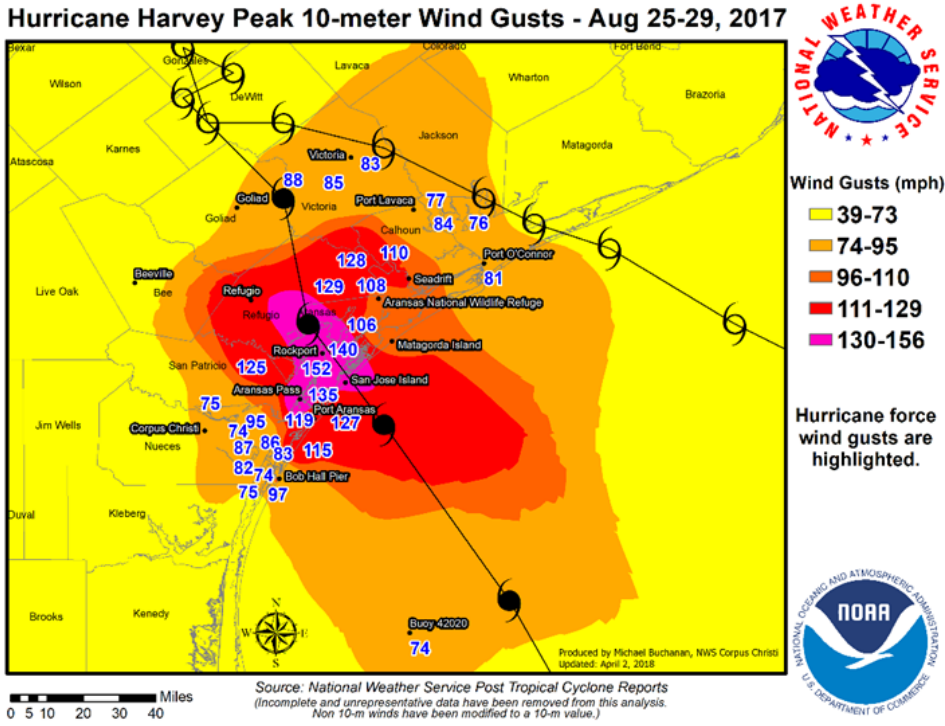
*Recommendation is to plan for one category higher than forecast*

# Harvey's Landfall

## Radar Image at Landfall




## Wind Gust Map

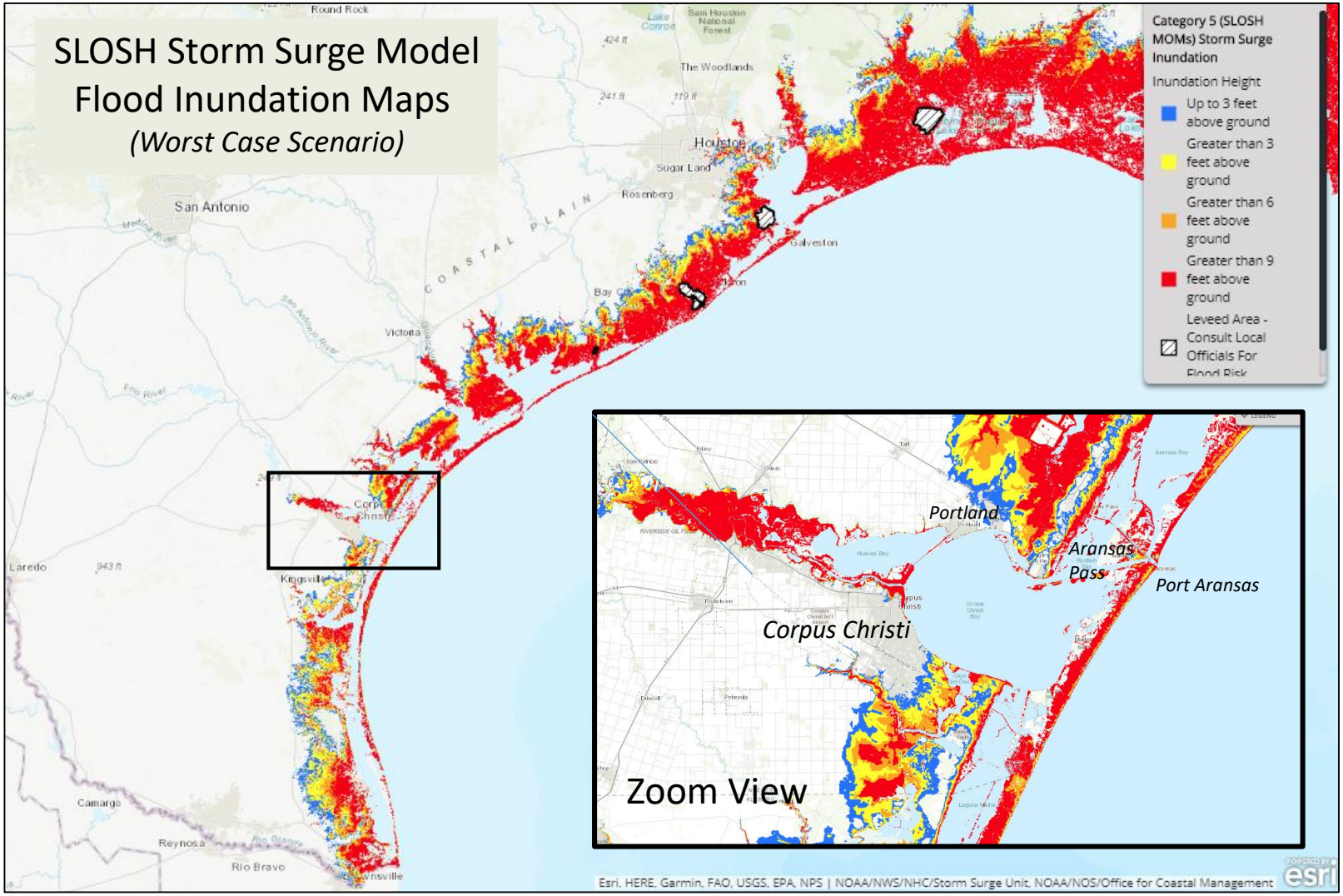



Harvey's maximum winds were observed in the red reflectivity band surrounding the eye.

Harvey's slow storm motion resulted in peak winds lasting a total of 4 to 5 hours and hurricane force winds lasting 13 hours.

Harvey's Peak Wind Gusts Measured by Instruments and normalized to 10 meters above ground

# Storm Surge Risk Maps




Flood Insurance is recommended, if you live in a storm surge zone

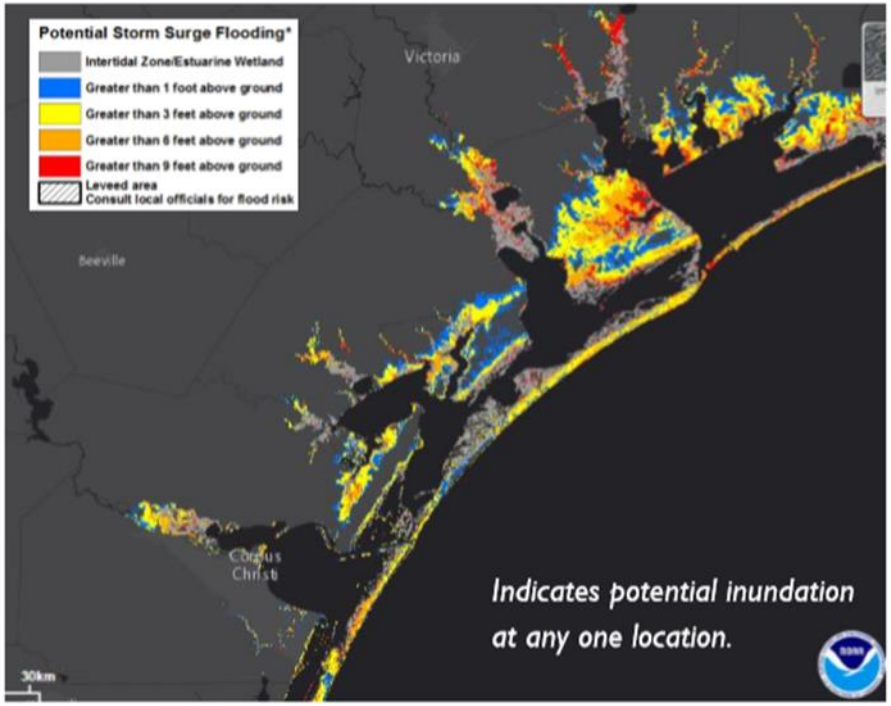
Source – NOAA National Hurricane Center: http://noaa.maps.arcgis.com/apps/MapSeries/index.html?appid=d9ed7904dbec441a9c4dd7b277935fad&entry=1

# Harvey's Storm Surge Forecast

## Potential Storm Surge

Hurricane Harvey

Corpus Christi
WEATHER FORECAST OFFICE




**Reasonable Worst Case Scenario Map**

### Areas of greatest risk:

- Plan for peak storm surge flooding of 6-12 feet above ground level along the Mid Texas Coast.

### Timing

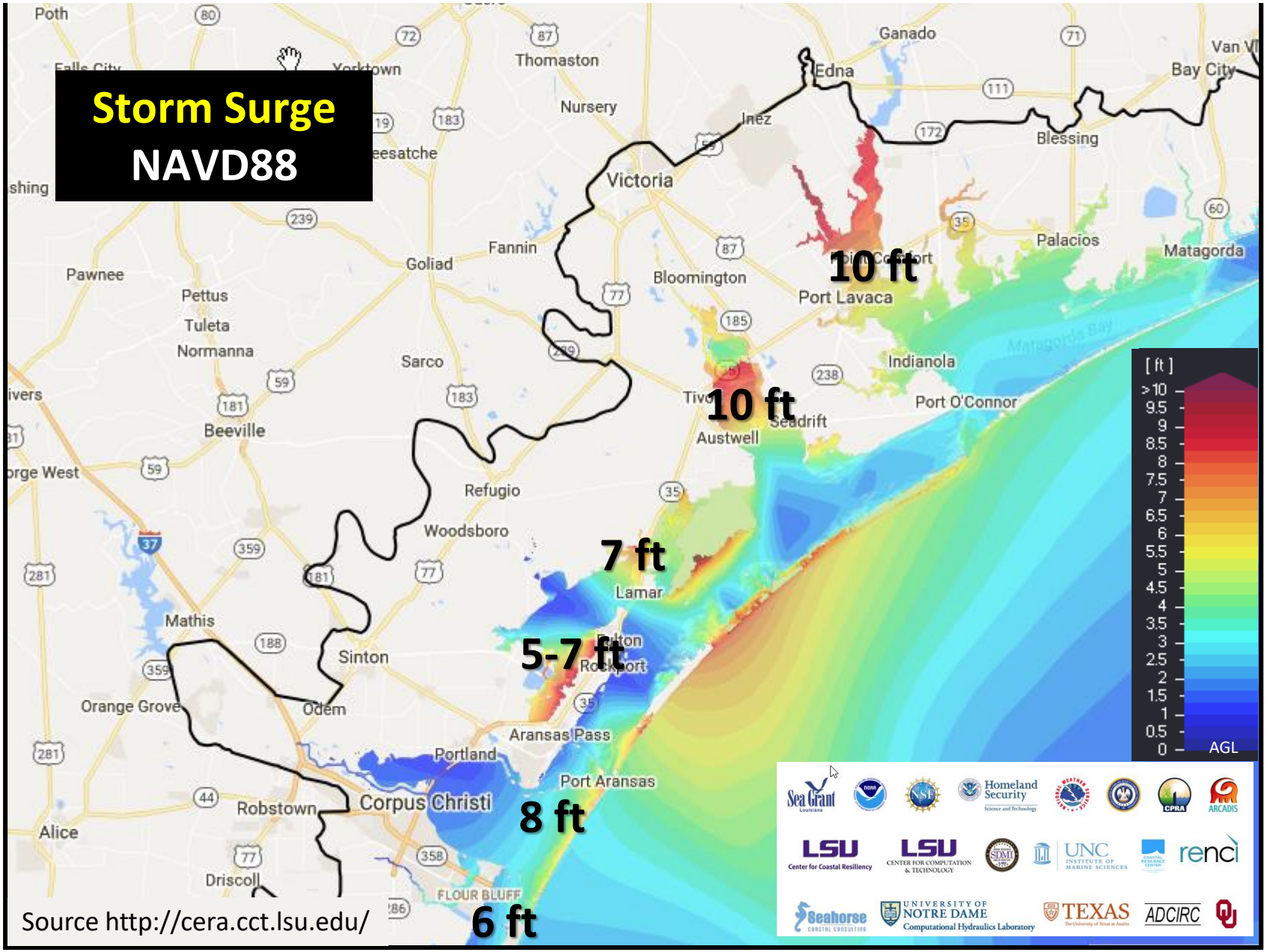
- Life Threatening Storm surge inundation will begin as early as Friday morning with peak Friday Night and Saturday.

8/24/2017 5:27 PM

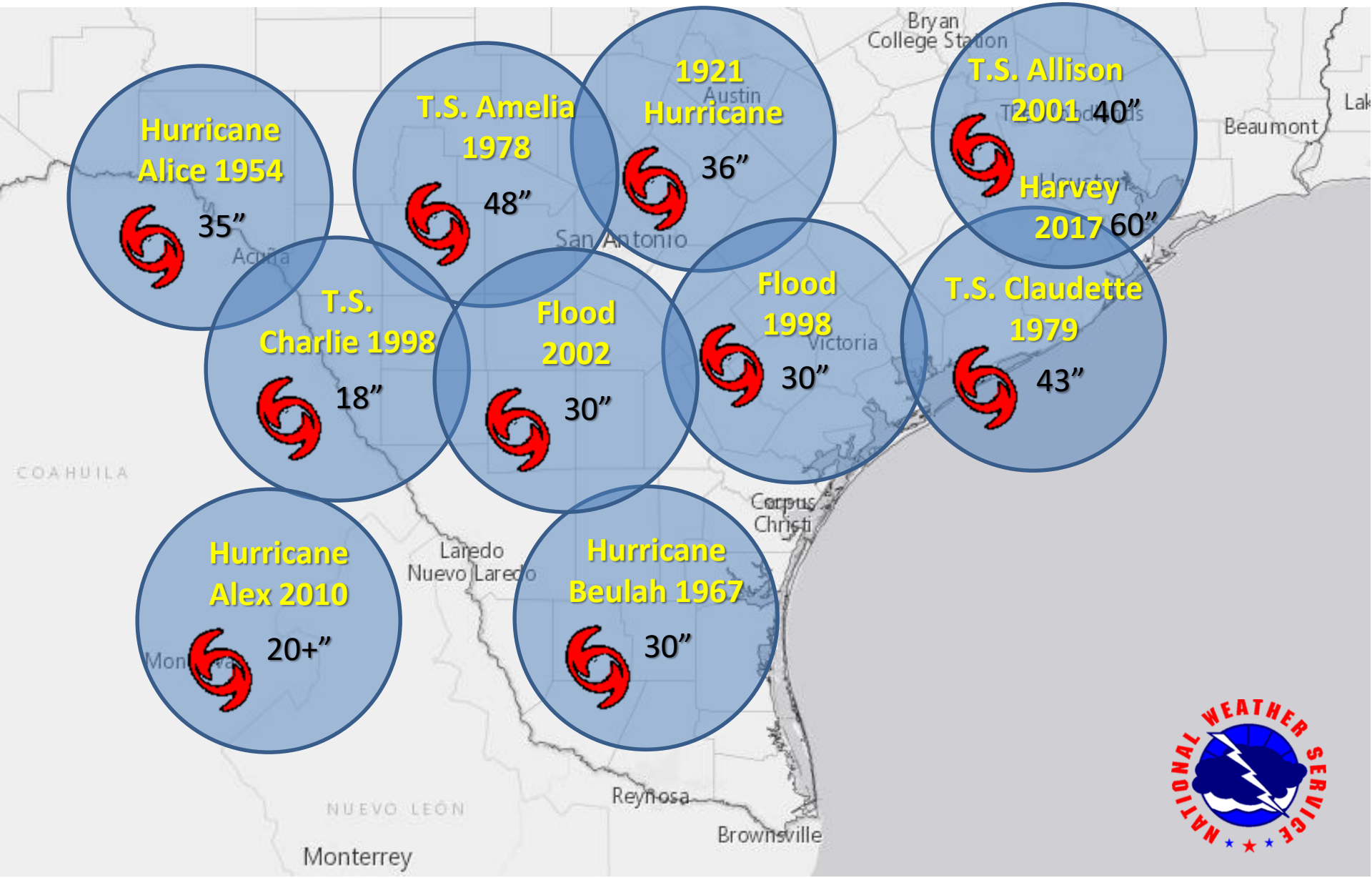
www.weather.gov/CorpusChristi

Source – NOAA National weather Service Briefings Slides Aug 24, 2017 @ 5:27 PM

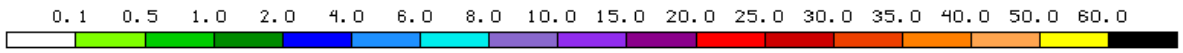
# Harvey's Storm Surge Footprint



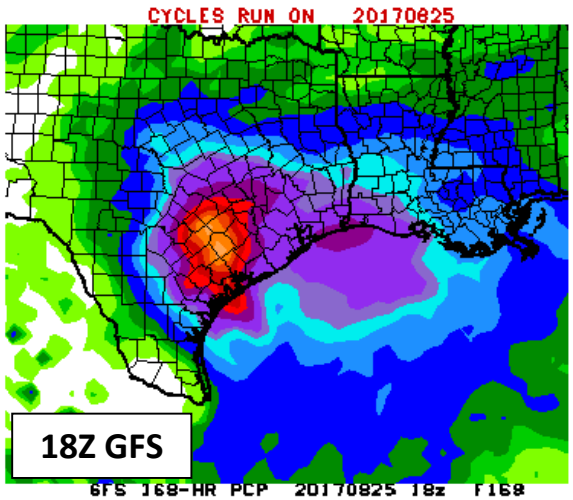
# History of South Texas Floods

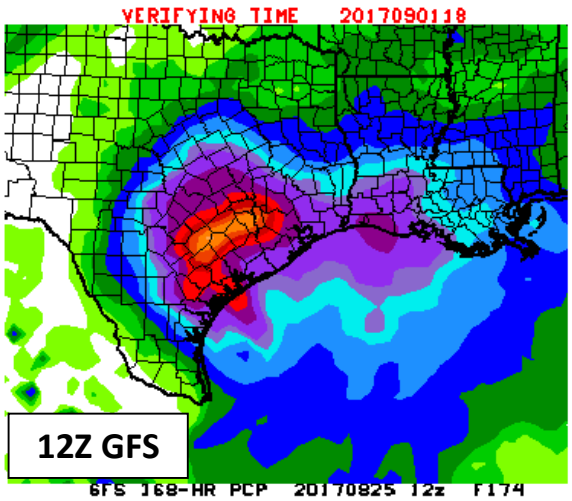


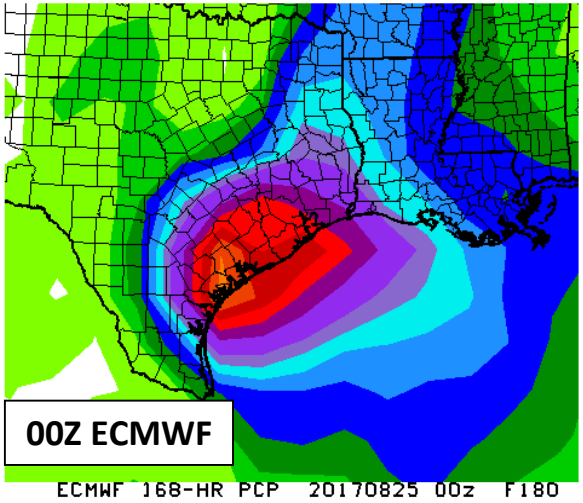
# Harvey's Rainfall Forecast

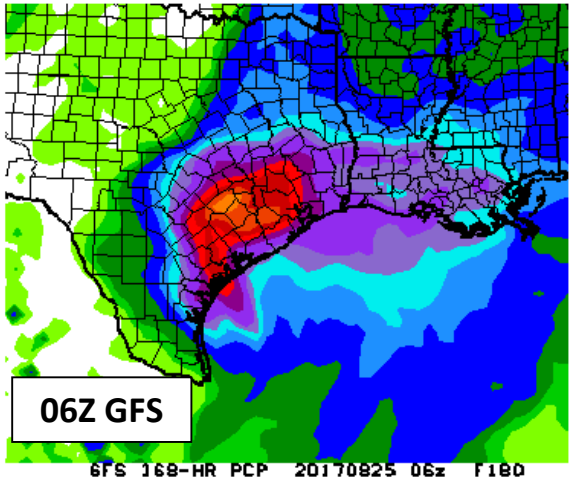


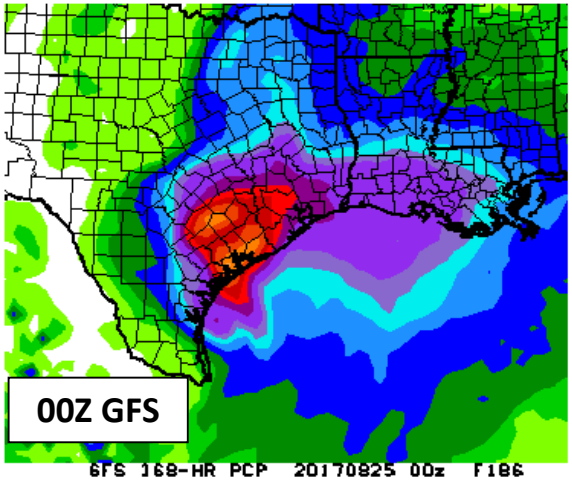

**Friday 8/25 Cycles**

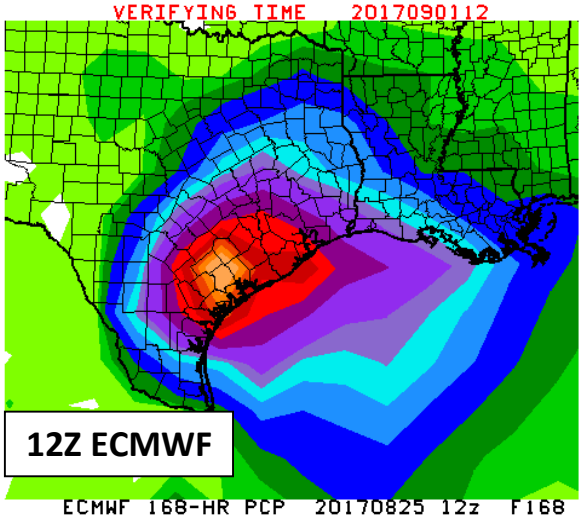


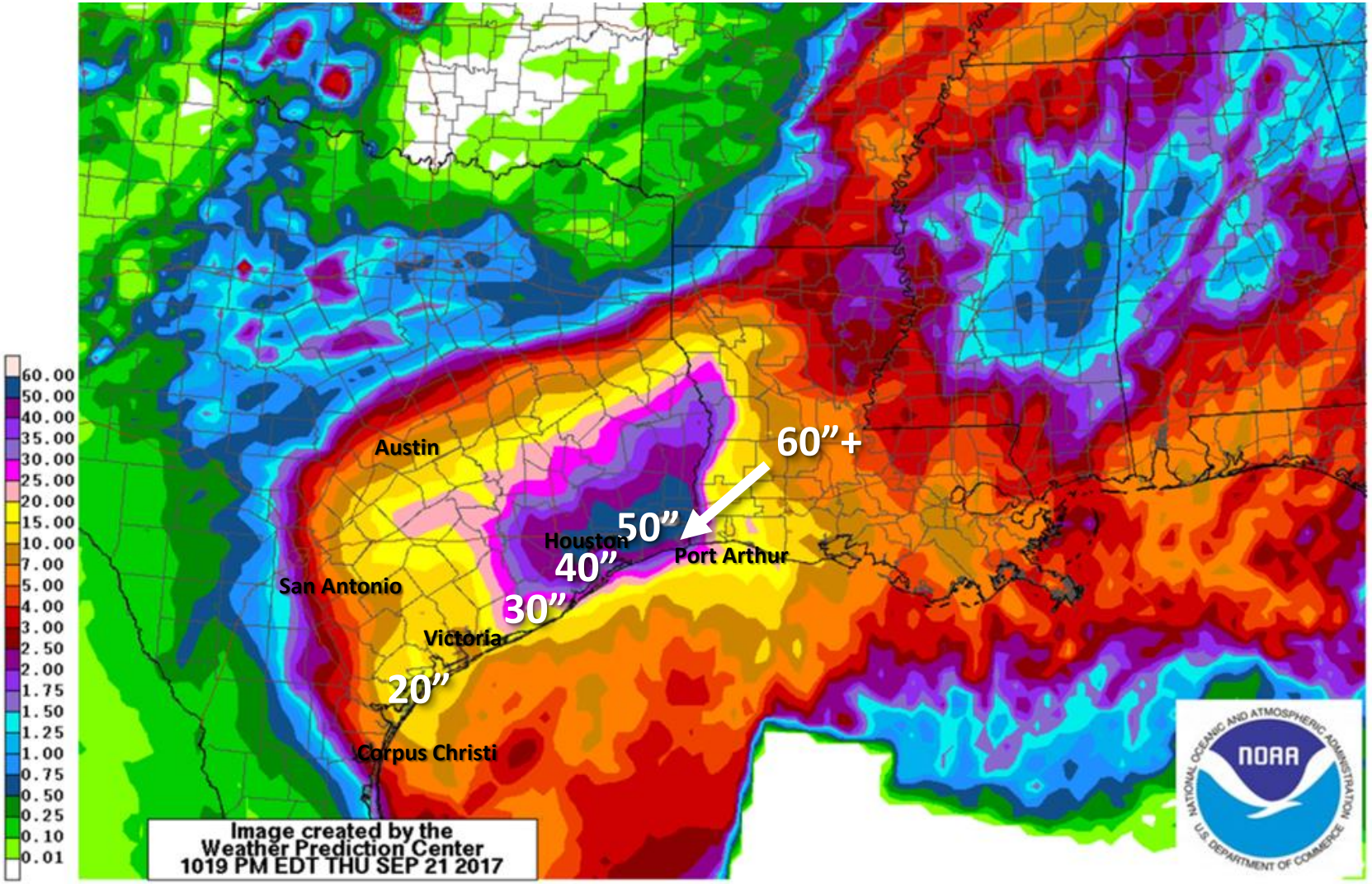




Model Forecasts shows rainfall totals exceeding 40 inches in portions of southeast Texas.

# Harvey's Actual Rainfall



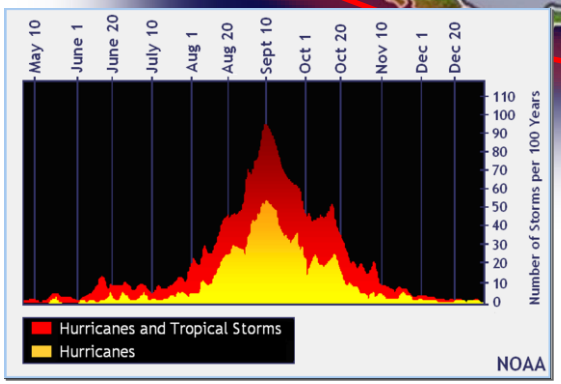

Harvey Flooded 290,000 homes and 500,000 vehicles in Southeast Texas

80% had no flood insurance

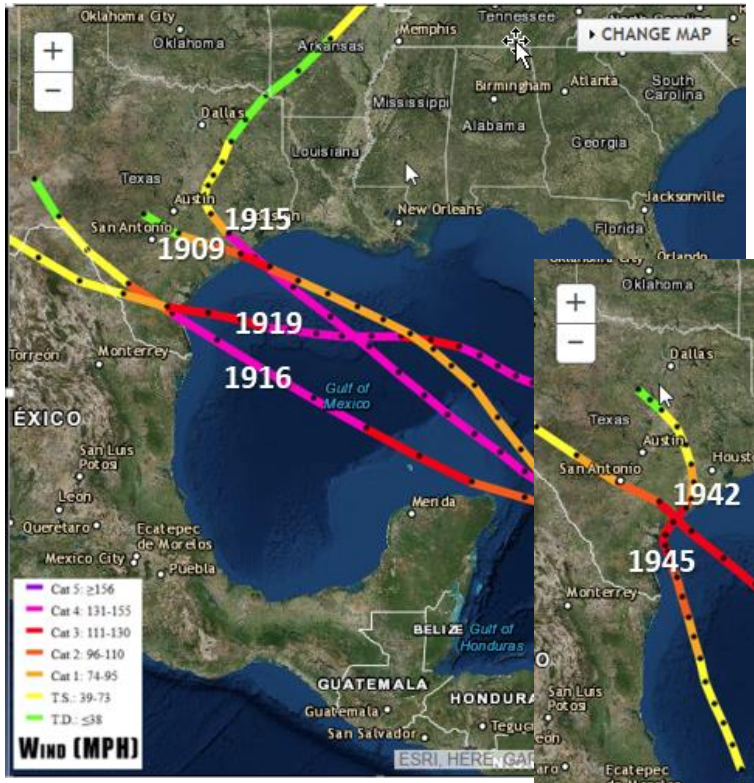
# Preparation/Actions Before/During/After Hurricane Harvey

- NWS has worked closely with Emergency Managers along the Mid Texas coast for 15 years, conducting site visits, providing training, participating in numerous meetings and workshops, tabletop exercises, AAR's, and community preparedness events. NWS is member of CBEMA which has hosted annual Coastal Bend Hurricane Conference in Robstown past 8 years.
- NWS deployed meteorologists to Corpus Christi and Victoria Emergency Operations Centers in advance of Harvey. Provided on-site support for 5 days beginning on 8/23.
- NWS conducted a total of 23 Conference Calls/Webinars, 36 email briefings, and sent 319 tweets before, during and after Harvey.
- During Hurricane Harvey, NWS provided very specific text and phone briefings to emergency managers in Port Aransas, Aransas Pass, Rockport, Fulton and DPS Corpus Christi on the timing of the eyewall passage through the local areas. These briefings allowed the EMCs in Rockport and Fulton to rescue/shelter nearly a dozen citizens during the eye of the storm and approximately 200 following the eyewall passage through daybreak as conditions improved.

# 2018 NOAA Season Outlook?




*Near normal to above normal*

*Driven by status of El Nino, Ocean Temperatures, Wind Shear, African Monsoon, Multi-decadal Cycle*

# Active Decades